Circular No. 6067,
May, 1928.

INFORMATION CIRCULAR

DEPARTMENT OF COMMERCE - BUREAU OF MINES

TOUCH PAPER[1]

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One of the major problems to which the U. S. Bureau of Mines has given a great deal of time and study since its organization is greater safety in blasting in coal mines, particularly with reference to gassy mines. In the study of this problem the Bureau has usually had the hearty cooperation of manufacturers, operators, and officials of State mining departments. There has been a fairly generous adoption of the use of permissible explosives in many States, together with other related recommendations by the Bureau for safer methods in blasting. Utah prohibits the use of any other explosives than permissibles in the blasting of coal. Generally the trend has been in the right direction, but there are some decided exceptions to this, and in some of the coal-mining districts in the State of Washington there is in use a somewhat unique, antiquated, and potentially hazardous practice--firing shots in gassy coal mines by the use of so-called "touch paper."

Touch paper is usually made at the mine by the lamp man, by thoroughly soaking ordinary cardboard about 1/16 inch thick in a solution of water and saltpeter in the proportion of 1 ounce of saltpeter to 1½ pints of clean water. In some instances vinegar is used with the saltpeter instead of water. The impregnated cardboard is dried, usually in an oven, and cut into strips about 1 inch wide. The cardboard, which is now touch paper, is ready for use by the shot firers. The shot firers enter the mine after the shift is out equipped with a permissible electric cap lamp, a key-locked flame safety lamp, and a supply of touch paper. Permissible explosive, cap and fuse, and incombustible stemming are used for the most part in mines that are on a closed-light basis. The coal pitches from 30 to as high as 80° in some of the mines west of the Cascade Mountains. Solid shooting prevails in these pitching beds.

The shot firers, who are qualified fire bosses in accordance with State regulations, first made a careful inspection for the presence of methane at the face to be blasted, using the low or nonluminous flame. If the place is clear of explosive gas the procedure is as follows: (1) The flame in the safety lamp is extinguished, (2) the bowl of the lamp is unscrewed from the top, (3) a strip of

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touch paper about 2 inches in length is placed on the bowl of the lamp near the wick, (4) the lamp is reassembled, (5) the lamp is relighted, which enables the shot firer to ignite the touch paper, (6) the lamp is again extinguished, (7) the lamp is taken apart as before and the touch paper, which is now burning along the edge with a glow, but no flame, though with an occasional sputter due to the saltpeter, is removed, and (8) the lamp is again assembled and lighted. This procedure is repeated as often as may be necessary during the shift. The touch paper is then used to light the fuse. All shots are lighted in rapid succession, reliance being placed on the varying lengths of fuse to insure their going in proper sequence. This of itself is a decidedly unsafe practice inasmuch as all shots except the initial one are dependent shots. In addition to this other definite hazards exist, due to this system of blasting. The key-locked flame safety lamp is not the least of these and use (or possibly it is better to say misuse) of the key-locked flame safety lamp has resulted in considerable loss of life and property. It should be discarded for the permissible magnetic-locked lamp. The glowing touch paper, to all intents and purposes, constitutes an open light and again there is the possibility, even a very definite danger, of ignition of gas from the burning fuse.

Electric blasting employing delay-action detonators would be much less hazardous than the present system and could be used to advantage, no doubt, were it not for the fact that it would still involve the dependent shot feature, and there might be ignition of gas or dust from those shots which immediately follow others. The safer method, and the one the U. S. Bureau of Mines urgently recommends, is the firing of one shot at a time electrically, with a permissible single-shot blasting unit, using a detonator of suitable strength (not less than a No. 6). The Bureau of Mines has approved for permissibility eight single-shot blasting units.

Under this system it would be necessary, of course, for the shot firer to climb to the face in the case of steep pitches to attach the firing line to each succeeding shot. This reason has been advanced in justification of the present system as against electric blasting. It is believed, however, that the safety features involved in single-shot electric blasting will far outweigh any trouble o additional expense incurred incident to its adoption.

Undoubtedly the safest blasting system to use in these mines is that used widely in the coal mines of Utah, where all shots are fired electrically, from the surface when every one, including the shot firers, is out of the mine.

Similarly, in these same districts the practice of lighting shots with round braided lamp wicking (lampcotton) prevails in certain closed-light mines. Prior to entering the mine the shot firer lights one end of a roll of wicking which burns with a dull glow. Whenever the fire tends to become extinguished the wicking is whirled rapidly until the desired degree of combustion is restored. When the face is reached the same procedure is followed as with touch paper. What has been said with reference to existing hazards incident to the use of touch pape is equally applicable to the practice of using lamp wicking for firing shots.

There is no doubt of the very definite danger in using either the touch paper method or glowing cotton wick with fuse in blasting coal. Safety demands that these antiquated methods be abandoned for the more modern and far safer method of blasting electrically.

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